An example of an asphalt which can be used to make a coating portion passing the weathering test is an asphalt containing primarily Alaska North Slope crude. An example of a lower cost asphalt which can be used to make coating portions that do not pass the weathering test is an asphalt containing predominantly California crude.

In another embodiment of the invention, the coating of the roofing material is varied in composition to increase the reflectivity or solar reflectance of the coating. A highly reflective coating would allow up to a 5% increase in shingle reflectivity in a standard shingle. A more reflective shingle can reduce the amount of solar radiation penetrating the roof of a building, thereby lowering the air conditioning costs of the building. Alternatively, a highly reflective coating would allow the use of less opaque (or fewer) granules. Referring again to Fig. 2, the reflectivity is increased by using an asphalt-based coating having a high reflectivity in at least the top surface layer 24T of the top portion 24A of the coating. The high reflectivity is defined by a solar reflectance of at least 0.7 when tested by ASTM Method E903. An asphalt-based coating having a high reflectivity can be produced by incorporating metal flakes into the coating. These flakes may be further coated with metal oxides such as titanium dioxide or zinc sulfide to further increase the reflectivity.

However, the bottom portion 24C of the coating does not have the high reflectivity, because reflectivity is not needed in this portion of the coating. Specifically, the coating in this portion of the roofing material has a solar reflectance less than 0.7. This allows the use of lower cost asphalts in the bottom portion. In some embodiments, the top portion 24A of the coating except for the top surface layer 24T is also made with a lower cost asphalt, and/or the mat portion 24B of the coating is made with the lower cost asphalt.

In another embodiment of the invention, the roofing material is a laminated roofing material such as a laminated shingle. Laminated roofing

shingles are usually stacked face to face in a bundle. The weight on the shingles in the bundle may cause the top coatings of adjacent shingles to stick together, particularly in warm temperatures. In accordance with the invention, the coating of the roofing material is varied in composition to reduce face to face sticking of shingles or other roofing materials when they are stacked together.

Fig. 3 illustrates a laminated roofing shingle 30 according to the invention. The laminated shingle includes an underlay 32 and an overlay 34 covering a portion of the top of the underlay, while leaving a portion of the underlay uncovered. Like the roofing material shown in Fig. 2, the underlay comprises a mat 22 saturated and coated with an asphalt-based coating 24. The coating includes a top portion 24A covering the top of the mat, a mat portion 24B saturating the mat, and a bottom portion 24C covering the bottom of the mat. The top portion 24A of the coating includes a top surface layer 24T.

The overlay comprises a layer of an asphalt-based coating. Typically, like the roofing material shown in Fig. 2, the overlay further comprises a mat 22 which is saturated and coated with the layer of asphalt-based coating 24. The coating includes a top portion 24A covering the top of the mat, a mat portion 24B saturating the mat, and a bottom portion 24C covering the bottom of the mat. The coating includes a top surface layer 24T. The laminated roofing material usually includes a top surface layer of roofing granules 36.

In accordance with the invention, at least the top surface layer of the overlay, and at least the top surface layer of the underlay on the uncovered portion of the underlay, are made with an asphalt having certain viscoelastic properties. The viscoelastic properties prevent the coating of one shingle from sticking to the coating of an adjacent shingle when the shingles are stacked face to face in bundles, the bundles are stacked onto pallets, and the pallets are stored at temperatures exceeding 90°F (32°C). In a specific embodiment, the shingles are Owens Corning Architectural Series laminated shingles, the shingles are

stacked face to face in a bundle of 22 shingles, four bundles are stacked on top of one another on a pallet, and the pallet is stored at 95°F (35°C) for 24 hours. None of the coatings of the shingles stick together so as to cause damage to the shingles when they are unpacked from the bundles. Preferably, the top surface layer of the overlay, and the top surface layer of the underlay on the uncovered portion of the underlay, are at least about 0.023 inch (0.58 cm) thick. In some embodiments, the entire top portion of the coating on the overlay and on the uncovered portion of the underlay are made with an asphalt having the viscoelastic properties to prevent sticking.

However, asphalts having these viscoelastic properties can be high in cost, and their use reduces the number of raw material choices. Consequently, instead of using such an asphalt for the entire roofing material, a lower cost asphalt not having the viscoelastic properties being used for coating the bottom portion 24C of the coating. In some embodiments, the mat portion 24B is also made with the lower cost asphalt.

An example of an asphalt having the viscoelastic properties is Trumbull asphalt manufactured by Owens Corning. An example of a lower cost asphalt not having the viscoelastic properties is an asphalt containing predominantly Venezuelan crude.

In another embodiment of the invention, the coating of the roofing material is varied in composition to markedly improve resistance of the roofing material to hail damage. The impact of heavy hail on a roofing material can cause granule loss, immediate or delayed, from the top surface of the roofing material. In some instances, the impact of hail can also cause a small tear or puncture in the roofing material.

Referring again to Fig. 2, resistance to granule loss caused by hail impact is improved by using an asphalt-based coating having an increased adhesion in at least the top surface layer 24T of the top portion 24A of the coating. In some